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Novel strategies for the stabilization of omega-3 PUFA: application in fortified foods

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Omega-3 polyunsaturated fatty acids (PUFA), especially eicosapentaenoic (EPA, C20:5n-3) and docosahexaenoic (DHA, C22:6n-3) acids, have numerous health beneficial effects. As a consequence, and due to the low intake of fish, krill or algae-based products by Western populations, the fortification of foods with omega-3 PUFA has gained an increasing interest by industry. However, omega-3 PUFA are highly susceptible to oxidation, which leads to the loss of nutritional value as well as the formation of unpleasant off-flavors and toxic compounds. Therefore, lipid oxidation must be prevented in order to successfully develop foods enriched with omega-3 PUFA.

Common strategies for reducing or inhibiting the oxidation of omega-3 PUFA when incorporating them into foods are the employment of antioxidants and the use of fish oil-in-water emulsions or fish oil encapsulates as omega-3 delivery systems. The presentation will discuss recent advances on: 1) the production of fish oil-in-water emulsions with enhanced oxidative stability by optimizing interface properties (e.g. charge, thickness and presence of antioxidants), and 2) the development of novel fish oil-loaded nano-microencapsulates by using electrohydrodynamic processes (e.g. electrospraying and electrospinning). Furthermore, the efficacy of antioxidants from new sources (e.g. fish protein and seaweed) in delivery systems and fortified foods will be discussed.